

# Power

A WRITER WHOSE DAD LOVES POWER LINES EXPLORES HER OWN LOVE OF AIR-CONDITIONING, FEAR OF GLOBAL WARMING, AND CONCERN ABOUT NUCLEAR ENERGY'S HIDDEN COSTS

By Marilyn Berlin Snell

**SPRAWLED LIFELESSLY ACROSS A CHAIR** at my sister's home in Phoenix, I watch the mercury outside rise on its way to a high of 112.

Most metropolitan Phoenicians, 4 million and counting, cope with life in a solar oven by dialing down the thermostat. My sister's family is not among them. Although the National Weather Service has declared an "excessive-heat watch" today, my brother-in-law insists that the house be air-conditioned only at night—to 78 degrees—to avoid peak-load hours. A lone fan swooshes the air, and only when people are in the room. Behind his back I call him the Green Ayatollah.

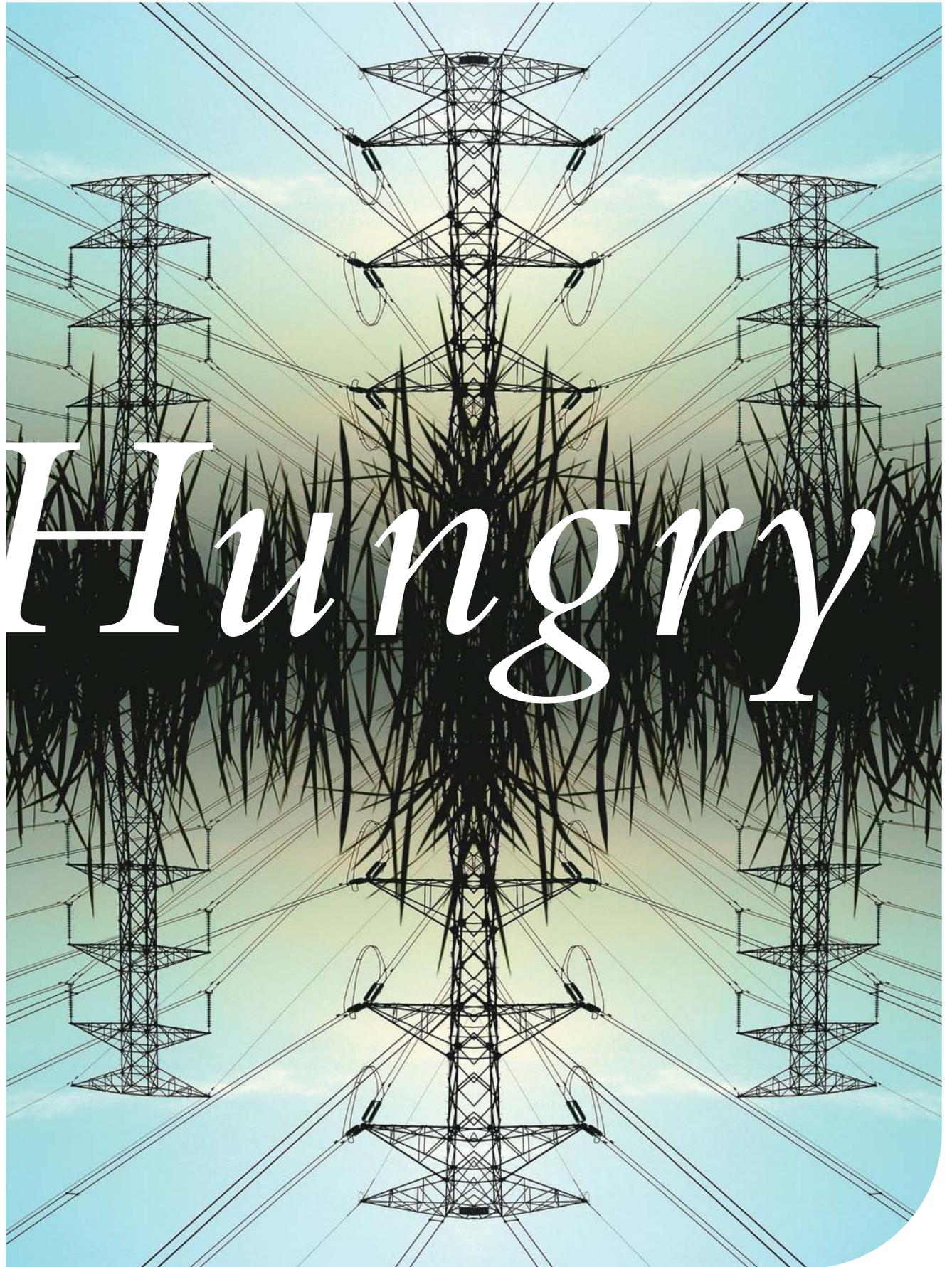
I grew up in Phoenix at a time when few people thought about energy or the impact of its production. Flip a switch and unseen forces surged through power lines, improving life instantly. It's not so simple now that we know the creation of electricity from coal, natural gas, and petroleum is one

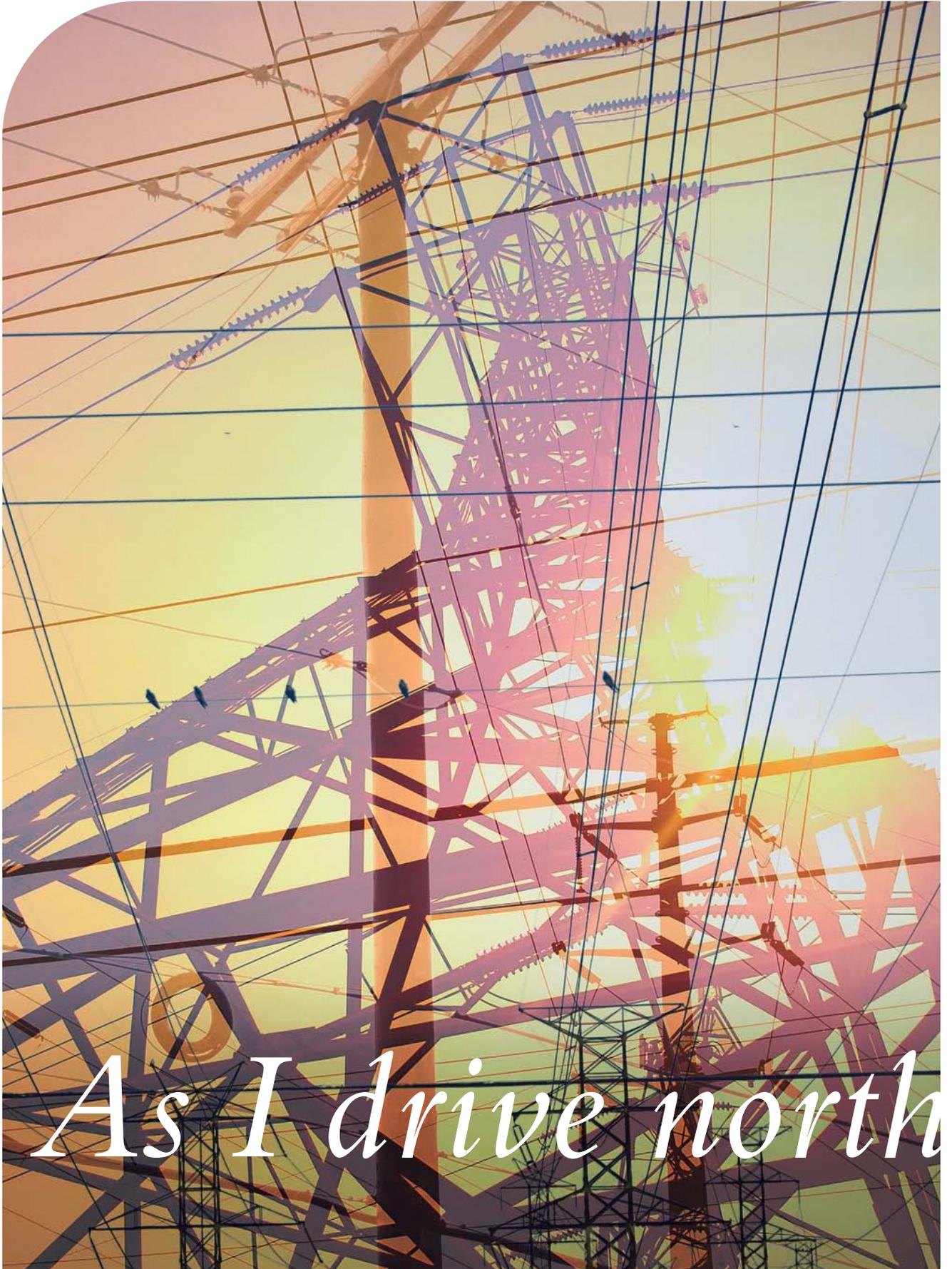
of the main reasons the planet is frying. This understanding, however, does not diminish my desire to turn the thermostat down a few degrees when my relations aren't looking.

In my many visits home, I've watched the exquisite Sonoran Desert around Phoenix disappear beneath big homes and asphalt that absorbs heat so that each day dawns with a sweltering head start. As temperatures rise, residents seek shelter beneath hard-to-cool vaulted ceilings. They work on computers and watch humongous flat-screen televisions.

Arizona's peak-load capacity—the maximum amount of juice state utilities can supply at one time—is around 17,000 megawatts. The load on this August afternoon approaches that. If just a few more Xboxes and microwaves switch on, the state's power grid will start to crash.

To keep that from happening, Arizona draws some electricity from out of state, mainly from California and Nevada. But





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most comes from coal plants in the Four Corners region; a few small wind, solar, and geothermal operations; and the Palo Verde Nuclear Generating Station, the nation's largest nuclear power plant.

For years my father ran the company that operates and is the largest owner of Palo Verde. I never visited the plant. My sisters and I felt we were doing our part for the planet by telling our parents at dinner that nuclear power is evil.

Now, with energy demands rising and global warming stirring public alarm, some people are beginning to rethink the cost-benefit calculus of nukes. Even a few environmental pioneers like Greenpeace cofounder Patrick Moore, Gaia theorist James Lovelock, and the *Whole Earth Catalog's* Stewart Brand have become nuclear evangelists, praising it as a clean alternative to fossil fuels. Perhaps it's finally time for me to take another look too.

**THE INTERSTATE UNDULATES MIRAGE-LIKE** ahead of me as I drive past 40 miles of tract homes to the outer reaches of metro Phoenix. I've got an appointment to meet Bill Post, my father's successor, at Palo Verde.

I've already gone through a background check. Even so, the buffed guys with wraparound shades and guns at their hips make me get out of my car while they search it. Inside the facility, armed personnel brief me on what to do in case of an emergency (stay with my guide, or call the number on my visitor's badge if my guide is "indisposed").

My dad had told me that Post, 57, loves stats and has an engineer's grasp of the nuts and bolts of power generation. He's right. As Post begins explaining how Palo Verde works, I can easily imagine a pocket protector on his cotton shirt. These nuclear reactors use well water to create the steam that turns the 160-ton General Electric turbines, he tells me. Twenty billion gallons of treated wastewater cross the desert from Phoenix each year to cool the well water after it has passed through the system, he adds.

The three-reactor, 3,940-megawatt nuclear facility runs 24 hours a day, seven days a week, cranking out enough juice to satisfy 25 percent of the state's energy needs—about the amount of power that sustains Phoenix.

Over the short term, Post says, his company will try to keep up with Arizona's growing demand by purchasing energy from other regions, enacting policies to encourage customers to reduce or change the timing of their power consumption, and promoting the use of wind and solar. (His

company offers rebates for installing solar panels.)

But he's a realist. Per-capita electricity use during peak-load hours has gone up 20 percent in Arizona over the past decade, and the state's population is growing 3.5 percent a year. Post watches these trends, he says, as a deeply interested yet ultimately neutral observer. "There are more-efficient appliances, windows are more efficient, and insulation is better," he says. "But people are just using more energy."

We're in the visitor center, where a one-ton lump of coal sits on the floor as if it fell from outer space. Next to it is a facsimile of a uranium-235 fuel pellet—about the size of a bullet—that produces an equivalent amount of power. Fifty pellets go into each of 236 fuel rods, which are then fashioned into an assembly. Each reactor core contains 241 assemblies.

"If we're going to deal with the growing energy demands and environmental challenges," Post says, "nuclear is the answer."

As the daughter of a man who hangs photographs of high-tension lines as art, I've been hearing for years that delivering a way of life through wires is a complicated matter. I decide to follow the power to its source.

**PALO VERDE GETS ITS NUCLEAR FUEL** from Australia, Canada, South Africa, and Uzbekistan. But there is uranium much closer to home, and to get there I hit the highway we used to drive on family vacations—dogs slobbering in the back of the International Harvester, my sisters and I complaining about the heat, seat vinyl sticking to our sweaty limbs. Relief came as we climbed into the hills, past saguaros and prickly pear cacti to the ponderosa pines that grow on the Mogollon Rim. Then we'd dip gloriously into the high-desert redrock of the Navajo Nation, to country so fierce and strange I could never resist its spell.

As I drive north out of Gallup, New Mexico, the red sandstone gradually gives way to yellow—a clear indication of uranium and a sign that I'm getting close to the Nez family homestead.

Navajo land had always been closed to prospecting. But when a white man discovered radioactive ore there in 1918, uranium was in demand as a pigment and source of radium for medical purposes, and Congress quickly passed a law opening the territory. Within a few years, miners were working 40 claims on the reservation. During World War II, Navajo miners, unaware of radiation's dangers and unprotected as they dug the ore from rich veins, secretly sup-

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plied the Manhattan Project with some of the materials that became the world's first atomic bomb.

During the cold war, mines in the Navajo Nation and nearby yielded more uranium than anywhere else in the United States. Some of the material was highly enriched to produce weapons for a growing nuclear arsenal. Another less complicated process produced reactor fuel for the nation's increasing number of nuclear power plants.

The first time I met Teddy Nez and his wife, Bertha, they were sitting at their kitchen table on a chilly morning in the winter of 2006, a pile of snapshots between them. I'd come to the Indigenous World Uranium Summit in the Navajo Nation, where more than 300 international delegates had gathered to discuss how to protect tribal lands from resurgent uranium-mining interests. It was a problem the Nez family had been slowly drawn into over decades.

Teddy had married into Bertha's Red House clan and moved in 1970 to the Coyote Canyon area, an isolated stretch where Bertha's extended family has lived for generations in hogans and modest homes sprinkled across the high-desert landscape. Before long he shipped off to Vietnam. When he returned, a decorated veteran, he saw that they had company.

The Kerr-McGee Corporation was mining uranium at the north boundary of their family camp, and the United Nuclear Corporation was mining and milling the ore to the south, just across a barbed-wire fence marking the reservation line. Pipes protruding from UNC's pile of mill tailings flushed effluent into the arroyo, where the families' sheep and growing brood of children came to drink and play.

After the 1979 nuclear reactor accident at Three Mile Island, orders for new plants stalled. That, along with the importation of ore from other countries, sent uranium prices plummeting in the early 1980s. Mining operators on the reservation, including those near the Nezes, closed shop. Of the more than 1,000 mines that once operated on Navajo land, hundreds were abandoned before they'd been cleaned up. In the 1990s, the U.S. EPA and the Navajo Nation's own environmental agency began studying contamination problems and, in some places, squabbling about who would be responsible for the cleanup of toxics that included radium, a known carcinogen.

In 2005 the Navajo Nation banned any future uranium mining or processing in "Navajo Indian Country," which

includes areas not in the Navajo Nation proper but inhabited almost entirely by Navajos. It was a bold stroke, and those geographic perimeters are already being challenged in court by mining interests that have preexisting leases.

On that first visit with the Nezes in 2006, a dusting of snow clung to the tawny cliffs of the Coyote Canyon area. As we sat at the table, Teddy handed me a photo. It was of a butchered sheep from his herd. The meat was an unnatural yellow.

"It's not the first one, either," he said. Bertha showed me a picture of a lamb born without wool.

"It was smooth," she began. Teddy jumped in. "Like a baby Chihuahua! It didn't last a day," he said.

The uranium, the Nez family concluded, was contaminating everything and everyone nearby.

For years, sorting out whether the Navajo tribe, the state of New Mexico, or the federal government had legal jurisdiction in Coyote Canyon meant that no one addressed the Nezes' concerns. Only after a court resolved the matter did the EPA step in to initiate a cleanup.

The Navajo Nation and the EPA had long been feeding the results of soil samples and other information about radiation problems from across the reservation into a fancy geospatial database. Now they added the results of tests at Coyote Canyon.

The colorful printout of the abandoned mines and mill sites was the size of a conference table. The most contaminated site was ranked number one. It was listed as North-east Church Rock but is known to those who live there as Coyote Canyon.

Over Teddy's shoulder that winter morning, I could see that the wind had picked up. Small red flags scattered across the Nezes' property fluttered in the breeze, marking where the EPA had taken soil samples—more than 900, according to one of the agency managers who did the work.

"I feel like we have a little help now," Teddy said, touching the photos of his contaminated sheep. "At least compared to nothing, which is what we had before."

With the data so clearly showing that Coyote Canyon posed a danger to residents, the EPA moved the Nez family and others into temporary shelters. Workers began cleaning up—basically digging up a foot of soil and stockpiling it at the United Nuclear Corporation site next to the Nezes' property. General Electric, which now owns the property, was supposed to haul the soil away and safely dispose of it.

When I visit Coyote Canyon in August 2007, the Nezes are back home, and the place doesn't look the same. I drive past the hogan where Bertha's father lived. The flags are gone; the dirt surrounding the octagonal structure has been scraped. So has the earth around the Nezes' home and horse corral.

But the massive mound of contaminated earth, which the EPA had covered in heavy black plastic, has not been moved. The plastic is torn and blowing in the wind, along with fine particles of contaminated soil—a threat to the Navajos that seems, in my mind, a metaphor for the nuclear waste problem downstream.

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After a five-and-a-half-year run at the Palo Verde reactor, for example, the little uranium pellets become spent fuel that remains radioactive for hundreds of thousands of years. Workers remove the fuel rods and submerge them under 23 feet of water on-site for up to seven years. The Yucca Mountain storage site in Nevada won't open until 2017—if it opens at all—and until then there is no permanent disposal site for high-level radioactive nuclear reactor waste in the United States.

For now, workers transfer Palo Verde's spent fuel from the pool to stainless steel and concrete containers on concrete pads about twice the size of a basketball court. Currently 53 casks, weighing 165 tons each and stocked with spent fuel dating back more than two decades, stand upright like faceless statues in the blazing sun.

When I meet with Post, I ask about the legacy of uranium mining on tribal lands in the United States and elsewhere. He says he knows nothing about it. Few do.

What he does know about is supply and demand. Building a nuclear power plant is costly. In current dollars it would take \$15 billion to replicate Palo Verde. If, however, the United States puts a price on carbon dioxide emissions as a way to reduce greenhouse gases, nuclear power will begin to make better economic sense, Post says.

Last September, a company submitted the first application to build a nuclear plant in 30 years. In the next year or so, the Nuclear Regulatory Commission expects to process 19 applications. The agency is starting to hire 600 additional employees to deal with what some are calling a nuclear renaissance. The current energy bill includes tens of billions of dollars in loan guarantees for new nuclear plant construction.

That nuclear reactor waste still has no permanent home and will remain dangerous for millennia has become less alarming to some than the immediate threats of dependence on foreign oil and a planet being broiled by heat-trapping greenhouse gases. In Phoenix, where

the days are getting demonstrably hotter, it's easy to understand why people grab for what looks, at the moment, like the lesser of two evils—anything to keep those air conditioners humming.

And yet something Post says at the nuclear plant sticks with me. His company—my dad's company—had begun the long, drawn-out process of getting Palo Verde built in the early 1970s. Then the Arab oil embargo hit.

"Energy prices shot up . . . in some cases 200 percent," Post says. "We started insulation programs. We had rebate programs for more-efficient air-conditioning units. We saw a huge amount of conservation that in turn decreased all the energy-demand projections for the first time in our history."

Suddenly, Palo Verde looked unnecessary. Then the Arab world twisted the oil taps back on, prices plummeted, and consumers began sucking up energy again. By the time Palo Verde's first units came on line in 1986, the company's decision to build seemed prescient.

Post reminds me that the Arab oil embargo occurred at the dawn of the conservation movement, when there was plenty of waste to cut. He says it's harder now to gain big energy savings by, say, using more-efficient appliances and turning air conditioners to low.

I push back. During California's 2001 energy crisis, the state educated people about energy conservation and rewarded them with rebates for efficiency, and energy use went down substantially.

But that, too, Post says, was a crisis. And only another one, he fears, will spur politicians to change laws and citizens to alter their behavior to the extent required to significantly reduce energy demand. He hopes it doesn't come to that.

As the searing Phoenix sun beats down, I feel that it already has. ■

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